



PATENT  
0649-0619P

**IN THE U.S. PATENT AND TRADEMARK OFFICE**

Applicants: Yasuyuki TANAKA et al.  
Application No.: 08/941,132 Group: 1713  
Filed: September 30, 1997 Examiner: F. Zitomer  
For: MODIFIED NATURAL RUBBER

**DECLARATION UNDER 37 C.F.R. § 1.132**

Assistant Commissioner for Patents  
Washington, D.C. 20231

March 12, 1999

Sir:

I, YOSHIAKI MIYAMOTO, declare the following.

I graduated from Kyoto University on March 24, 1984.

I was employed by Sumitomo Rubber Industries, Ltd., on April 1, 1984.

Since that time I have been engaged in research and development concerning new materials.

I have read and understand the invention as described in the present specification and claims and have read and understand Yasuyuki et al. EP 0 584 597, Kondo et al. U.S. Patent No. 4,208,490, Burlett et al., U.S. Patent No. 5,118,546, or Hayashi et al. U.S. Patent No. 4,528,340.

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The present invention relates to either the grafting at a high efficiency or the epoxidizing at a high epoxidation ratio of rubber which has been modified by extracting the naturally occurring proteins. In my opinion, the problem with grafting the natural (non-modified) rubbers is that the proteins, naturally occurring in the rubber, adversely affect the grafting and epoxidation process, thereby reducing the efficiency. Upon review of Tables 1-3 on pages 20, 22 and 25 of the specification, it is clear that as the protein content decreases, the graft ratio increases, i.e., the percents of the monomers which are grafted to the main chain backbone of the rubber polymer increases. Likewise, the epoxidation ratio increases as the protein content decreases, as shown in Table 2. In my opinion, this is a result of the fact that the naturally occurring protein in the rubber molecules sterically hinder the reacting reagent from contacting the rubber. Additionally the naturally occurring proteins act as a substrate for the reacting reagent thereby decreasing the concentration and the reaction speed.

Since there is no teaching or suggestion by any of the cited references that proteins found in natural rubber reduce the efficiency of either the grafting or the epoxidizing of the rubber, then it logically follows that none of the cited references teach the unexpected advantages effected by deproteinizing the natural rubber prior to grafting or epoxidizing. In other words, the efficiency of either the grafting or the

epoxidizing of the rubber has increased to such an extent as to be unexpected by removing the naturally occurring proteins.

Furthermore, I would not find it obvious to graft and/or epoxidize the rubber of the Yasuyuki et al., since Yasuyuki et al. teach that the advantages of deproteinizing natural rubber include:

i) elevating the green strength, ii) preventing allergic reactions, iii) lowers water absorptivity of the rubber, iv) improved crepe characteristics, vii) improved aging resistance, and viii) stabilizes the vulcanizing characteristics. There is no teaching or suggestion by Yasuyuki et al. that proteins found in natural rubber will adversely affect the grafting or epoxidation of the natural rubber. Thus, in my opinion the present invention is not made obvious by the combination of the cited art.

All statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true. Further, these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

*Yoshiaki Miyamoto*  
Yoshiaki MIYAMOTO

22 September 1999  
Date